

1.3 Solving Linear Systems by Elimination

Solve the following system of equations:

$$17x + 23y = 35$$

$$26x - 23y = -121$$

Solve the following system of equations:
(try adding them together)

$$17x + 23y = 35$$

$$+ 26x - 23y = -121$$

$$\begin{array}{r} 43x = -86 \\ \hline 43 \quad 43 \end{array}$$

$$x = -2$$

$$\begin{array}{r} 25 \downarrow \\ + \quad 5 \downarrow \\ \hline 30 \end{array}$$

Solving Linear Systems by Elimination

Steps:

1. Write equations in the same form: $Ax + By = C$
 $y = mx + b$
2. Look for the coefficients of one of the variables to be the same (sign does not matter).
3. If necessary, multiply one or both equations by a whole number to achieve step 2.
4. a) Same coefficient, same sign: **subtract**
b) Same coefficient, opposite sign: **add**.
5. Solve the resulting equation.
6. Substitute to find the value of the other variable.

Ex.1 Solve: $x + y = 60$ $x - y = 8$

$$\begin{array}{r} x + y = 60 \quad ① \\ + \quad x + y = 8 \quad ② \\ \hline \end{array}$$

$$2x + 0y = 68$$

$$\frac{2x}{2} = \frac{68}{2}$$

$$x = 34$$

$$\therefore \text{the POI is } (34, 26) \quad y = 26$$

Sub $x = 34$ into ①

$$x + y = 60$$

$$(34) + y = 60$$

$$y = 60 - 34$$

Ex.2 Solve $5x + 2y = 5$ ① $3x = -23 + 4y$ ②

① $(5x + 2y = 5) \times 2$

② $3x - 4y = -23$

① $10x + 4y = 10$
+ $3x - 4y = -23$

$$\begin{array}{r} 13x \\ \hline 13 \end{array} = \frac{-13}{13}$$

$$x = -1$$

Sub $x = -1$ into ①

$$5x + 2y = 5$$

$$5(-1) + 2y = 5$$

$$2y = 5 + 5$$

$$\frac{2y}{2} = \frac{10}{2}$$

$$y = 5$$

∴ the POI is $(-1, 5)$

Ex.3

① $\left(\frac{x}{2} + \frac{y}{8} = 4\right) \times 8$

$$4x + y = 32$$

② $\left(\frac{x}{3} - \frac{y}{2} = -2\right) \times 6$

① $4x + y = 32$

② $4x - 6y = -24$

$$\frac{7y}{7} = \frac{56}{7}$$

$$y = 8$$

Sub $y = 8$ into ①

$$4x + 8 = 32$$

$$4x = 32 - 8$$

$$\frac{4x}{4} = \frac{24}{4}$$

$$x = 6$$

Assigned Work:

p.54 # 1, 4, 6odd, 11odd, 20*